CLAIMS

What is claimed is:

1. A method for measurement of multiple array elements of an array antenna, each array element having a variable phase shifter associated therewith, the method comprising:

illuminating the array with a coherent source signal;

cycling each array element phase shifter through a range of phase shifter settings at a unique rate;

combining the phase shifted signals from each array element to provide a composite signal;

processing the composite signal to extract a phase of the coherent source signal as received at each element; and

using the extracted phase for each element to determine a relative location of each said element.

2. The method of Claim 1, wherein said processing the composite signal comprises applying a Fast Fourier transform (FFT) to the composite signal, and extracting said phase of each element from the FFT.

3. The method of Claim 1, wherein the array antenna has an operating frequency band, and wherein the coherent source illuminates the array with a constant wave signal.

4. The method of Claim 1, wherein there is relative motion between the coherent signal source and the array, and said processing the composite signal further comprises:

processing the composite signal to compensate for said relative motion.

5. The method of Claim 4, wherein said processing the composite signal to compensate for said relative motion comprises applying an appropriate Doppler offset compensation.

6. A method for measurement of multiple array elements of an array antenna, each array having a variable phase shifter associated therewith, the method comprising:

illuminating the array with three coherent source signals respectively located at three different directions from the array antenna;

cycling each array element phase shifter through a range of phase shifter settings at a unique rate;

combining the phase shifted signals from each array element to provide a composite signal;

processing the composite signal to extract respective phases of the three coherent source signals as received at each element; and

using the extracted plurality of phases for each element to determine a location of each said element relative to the other elements in three dimensions.

7. The method of Claim 6, wherein said processing the composite signal comprises applying a Fast Fourier transform (FFT) to the composite signal, and extracting said phase of each element from the FFT.

8. The method of Claim 6, wherein the array antenna has an operating frequency band, and wherein the coherent sources illuminates the array with constant wave signals.

9. The method of Claim 6, wherein said illuminating the array with three coherent source signals comprises simultaneously illuminating said array with said three coherent source signals.

10. The method of Claim 9, wherein said processing the composite signal comprises splitting the composite signal into three components and passing one of said components through a processing channel tuned to a respective one of said three coherent source signals.

11. The method of Claim 6, wherein said illuminating the array with three coherent source signals comprises sequentially illuminating the array with respective ones of the three coherent source signals.

12. The method of Claim 6, wherein there is relative motion between the three coherent signal sources and the array, and said processing the composite signal further comprises:

processing the composite signal to compensate for said relative motion.

13. The method of Claim 12, wherein said processing the composite signal to compensate for said relative motion comprises applying an appropriate Doppler offset compensation.

14. A method for measurement of multiple array elements of an array antenna, each array having a module including a variable phase shifter associated therewith, the method comprising:

illuminating the array with first and second coherent source signals from first and second directions;

cycling each array element phase shifter through a range of phase shifter settings at a unique rate;

combining the phase shifted signals from each array element to provide a composite signal;

processing the composite signal to extract a phase of the first and second coherent source signals as received at each element; and

using the extracted phase for each element to determine a relative location of each said element relative to said first direction and relative phase delays through each said module.

15. The method of Claim 14, wherein said processing the composite signal comprises applying a Fast Fourier transform (FFT) to the composite signal, and extracting said phase of each element from the FFT.

16. The method of Claim 14, wherein the array antenna has an operating frequency band, and wherein the coherent source signals illuminate the array with a constant wave signal.

17. The method of Claim 14, wherein there is relative motion between the coherent signal sources and the array, and said processing the composite signal further comprises:

processing the composite signal to compensate for said relative motion.

18. The method of Claim 17, wherein said processing the composite signal to compensate for said relative motion comprises applying an appropriate Doppler offset compensation.

19. A method for measurement of multiple array elements of an array antenna, each array having a module including a variable phase shifter associated therewith, the method comprising:

illuminating the array with a number (n+1) of coherent source signals from n+1 directions;

cycling each array element phase shifter through a range of phase shifter settings at a unique rate;

combining the phase shifted signals from each array element to provide a composite signal;

processing the composite signal to extract a phase of the n+1 coherent source signals as received at each element; and

using the extracted phase for each element to determine a relative location of each said element relative to n directions and relative phase delays through each said module.

20. A method for measurement of multiple array elements of an array antenna, each array having a variable phase shifter associated therewith, the method comprising:

(i) illuminating the array with a first coherent signal source from a first direction;

(ii) cycling each array element phase shifter through a range of phase shifter setting at a unique rate;

(iii)combining the phase shifted signals from each array element to provide a composite signal;

(iv) processing the composite signal to extract a phase history of each element for said first source;

(v) illuminating the array with a second coherent source from a second direction generally orthogonal to said first direction;

(vi) repeating steps (ii) and (iii) to provide a composite signal for the second source;

(vii) processing the composite signal for the second source to extract a phase history of each element for said second source;

(viii) illuminating the array with a third coherent source from a third direction generally orthogonal to said first direction and said second direction;

(ix) repeating steps (ii) and (iii) to provide a composite signal for the third source;

(x) processing the composite signal for the third source to extract a phase history of each element for said third source; and the array with a second coherent source from a second direction generally orthogonal to said first direction;

(xi) repeating steps (ii) and (iii) to provide a composite signal for the second source;

(xii) processing the composite signal for the second source to extract a phase history of each element for said second source; and

(xiii) processing the phase histories for said first source, said second source and said third source to determine the location of each array element.

21. The method of Claim 20, wherein said processing the composite signal comprises applying a Fast Fourier transform (FFT) to the composite signal, and extracting the phase history of each element from the FFT.

22. The method of Claim 20, wherein the array antenna has an operating frequency band, and wherein the first source, said second source and said third source illuminates the array with respective constant wave signals.